

Web-based promotional media in enhancing customer engagement in the digital age

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Abstract: Coffee Shop faces challenges in marketing its products and needs a corporate website that can showcase its profile, products, and online ordering services to increase customer affordability and convenience. The business still relies on social media, WhatsApp, and phone calls to conduct transactions, which often confuses potential buyers and reduces their interest in purchasing the products. To overcome this problem, research was conducted to design and implement an effective website as a promotional and informational tool. The website was developed with a database programming base using the waterfall system design method, following five main stages: requirements analysis, system design, program code writing, program testing, and program implementation. The Unified Modeling Language (UML) selection as a modeling tool ensures that the system analysis and design are well structured. The results of this research include four diagrams and six tables that support the structure and functionality of the website. The website was tested using the black box testing method on a local server, with results showing that the system successfully promoted and provided detailed information to potential customers. The available search function allows customers to easily search for products based on keywords, making ordering more efficient.

Keywords: Decent work and economic growth; Coffee shop; Unified modeling language; Promotion

1. Introduction

In an era filled with advances in information technology, modern society is increasingly facilitated by the existence of sophisticated technological innovations ([Prasetya, Fortuna, Jalinus, et al., 2024](#); [Prasetya, Syahri, et al., 2023](#); [Samala et al., 2024](#)). This allows various daily activities to be carried out more quickly and efficiently. In addition, the development of computer and information technology has enabled faster, more accurate and comprehensive information dissemination, including through website platforms ([Prasetya, Fortuna, et al., 2023](#); [Prasetya, Fortuna, Samala, et al., 2024](#)).

Websites are becoming one of the main tools for distributing information and communicating effectively in globalization ([Lv et al., 2022](#)). Various types of information, such as the latest news, products and services, tutorials, and social interactions, can be accessed quickly using only digital devices such as computers, tablets, or smartphones ([Arthur-Nyarko et al., 2020](#); [Haleem et al., 2022](#)). This ease of access provides convenience for users and opens up new opportunities for businesses to expand their market reach and improve interaction with customers. Utilizing information technology through websites also provides significant advantages in operational efficiency ([Akpan et al., 2022](#)). Businesses can automate their business processes, including marketing, sales, and customer service. This reduces operational costs, increases productivity, and responds to changing market demands ([Wamba-Taguimdje et al., 2020](#)).

Although Coffee Shop has used social media such as Instagram and Facebook as tools for promotion and information, its owner recognizes that the algorithms on these platforms can limit the reach of its business ([Yudha & Hendriyani, 2024](#)). Consequently, a further solution is needed: to create a company website that can display the company profile and products online, as it is generally owned by other businesses ([Veleva & Tsvetanova, 2020](#)). This is expected to provide wider accessibility and minimize dependence on advertising costs on social media platforms and WhatsApp.

To overcome this challenge, the author formulated a study focusing on developing a web-based website for Coffee Shop. The SDLC Waterfall model is used, which describes the software development process sequentially from analysis, design, coding, and testing to support ([Amali et al., 2019](#); [Sriadhi et al., 2022](#)). In terms of design modelling, the Unified Modeling Language (UML) is used as a standard tool to effectively visualize and document software systems ([Wang et al., 2021](#)). Thus, this research aims to develop a web-based promotional and information media that can provide innovative solutions to the problems faced by Coffee shops. Hopefully, with this website, the company can improve its customer promotion service and become an effective alternative in managing web-based systems.

2. Methods

This research uses the waterfall method approach of the Unified Modeling Language (UML) modelling design. UML is a visual modelling method used to design object-oriented systems and has become an industry standard for visualizing, designing, and documenting software ([Chen et al., 2019](#); [Rismayani et al., 2022](#)). Although not a programming language, UML allows direct mapping of the created models to various object-oriented programming languages such as Java ([Jang et al., 2024](#)). UML consists of graphical elements that make up nine main diagram types ([Wang et al., 2021](#))

The types of diagrams in UML cover several essential aspects. Use Case Diagrams display the interaction between actors and the system through actions and sequences of events. Additionally, Activity Diagrams visually represent the system's states and transitions, capturing the flow of processes and functions within the system through a graphical format. Sequence Diagrams, on the other hand, illustrate the temporal interactions between objects via messages, organized along a vertical time axis and a horizontal axis for associated objects. Simultaneously, Class Diagrams depict groups of objects sharing common attributes, operations, methods, relationships, and behaviours, offering a comprehensive view of the system's structure.

The stages of the waterfall method consist of several main steps. First, Requirements Analysis establishes system services, constraints, and objectives through user consultation to define detailed system specifications. Second, System Design allocates hardware and software requirements and forms the overall system architecture. Software design at this stage involves identifying and describing the fundamental abstractions of the software and their relationships. Third, Program Code Writing transforms the software design into a series of programs or program units, verifying that each unit meets its specifications. Fourth, Program Testing combines the program units and tests the complete system to ensure conformance to the software requirements before it is delivered to the customer. Finally, Program Deployment and Maintenance involves correcting errors missed in the previous stages, improving system unit implementation, and enhancing system services per new requirements ([Solehatin et al., 2023](#)). Utilizing UML and the waterfall method, this research aims to provide effective and innovative system design solutions, making it easier for companies to promote, serve customers, and optimize web-based processes ([Buchori et al., 2023](#); [Li & Liu, 2023](#)).

3. Results and discussion

3.1 Needs Analysis

The needs analysis stage aims to detail and describe the need to update web-based promotional and information media for Coffee Shop. The primary data collection will be interviews with coffee shop owners, who will provide information about the company, profile, promotion, and products sold. Furthermore, secondary data from archives, files, and images complement the primary data, including shop profiles, company documents, and previous research relevant to this study.

This research data processing model uses primary and secondary data analysis. Then, the design is made according to user needs. Next, testing website applications as a medium of promotion and information. Finally, website implementation and maintenance.

3.2 System analysis

This stage breaks down the information system into components to identify and evaluate existing problems, opportunities, obstacles, and needs. The system to be built is a PHP-based website application with a MySQL database, using a framework for ease of work and maintenance.

3.3 Non-functional requirement analysis

The designed system must fulfil the following needs: Usability by designing an easy-to-use interface. Next, security with a security system with login and logout features. Finally, flexibility with good data organization for easy access.

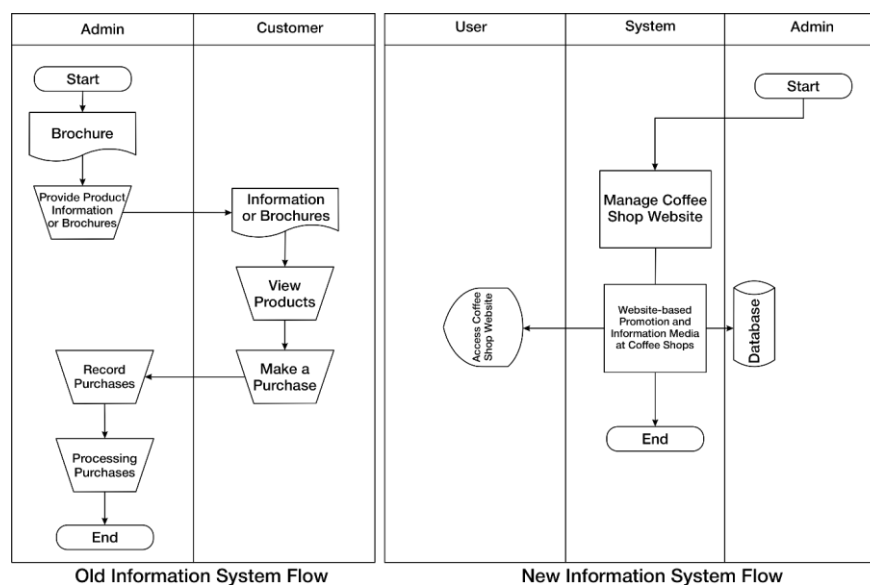
3.4 Functional requirement analysis

Based on primary and secondary data and existing business processes, some of the minimum requirements generated are as follows: Admins must be able to manage general and specific website data, provide information about companies, products, and partners on the main page, and display this information on the system. Additionally, the admin must record changes, additions, deletions, and data searches. On the user side, they should be able to view information about the company, products, and partners and order products via WhatsApp.

3.5 Information system analysis

The design requirements using the Unified Model Language (UML) for developing promotional and information media at a web-based Coffee Shop include several essential diagrams. First, Use Case Diagrams describe the interaction between actors (Admins and Visitors) and the system, as well as the main functions provided by the application. This diagram helps identify and understand various functional requirements from the user's point of view.

Figure 1.
Information system
flow



3.6 System design

The following is a description of the use case diagram definition in Figure 2 proposed in the application of developing promotional and information media in web-based Coffee Stalls. In this use case diagram, there are two main actors, namely Admin and Visitors. Admins have full access to manage all features in the application, including managing company data, products, and other information. On the other hand, visitors can access general information, view the products offered, and place orders through the application.

Figure 2.
Usecase diagram of
coffee shop



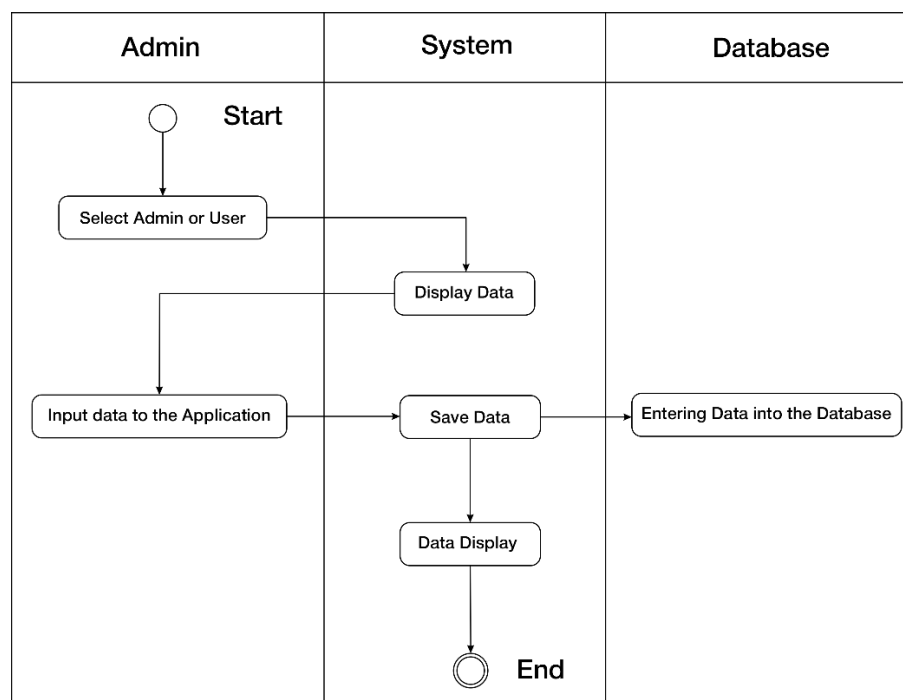
The proposed use case includes several essential functions. Firstly, Managing Company Data allows Admins to add, update, and delete information related to the company profile, history, vision, mission, and other relevant details. Secondly, Manage Products enables Admins to add, modify, and remove product information, including descriptions, prices, and images. Thirdly, Manage Promotions permits Admins to create and update ongoing promotions or discounts offered at the café.

Additionally, Visitors can View Company Information, View Products, and Place Product Orders. They can access and read details about the company profile, browse the list of products, and place orders processed via WhatsApp for confirmation. Admins are also capable of managing orders, which

allows them to review, manage, and process user orders. The system includes Login and Logout features for Admins to ensure access security, restricting management functions to authorized users only. Furthermore, the system logs activities, recording changes made by Admins, such as product additions or deletions, and other information updates.

Overall, this use case diagram will visualize user interaction and system interaction, detailing the process flow within the web-based Coffee Shop's promotional and informational application. This approach ensures comprehensive coverage of functional and non-functional requirements, delivering an optimal and efficient user experience.

Figure 3. User activity diagram

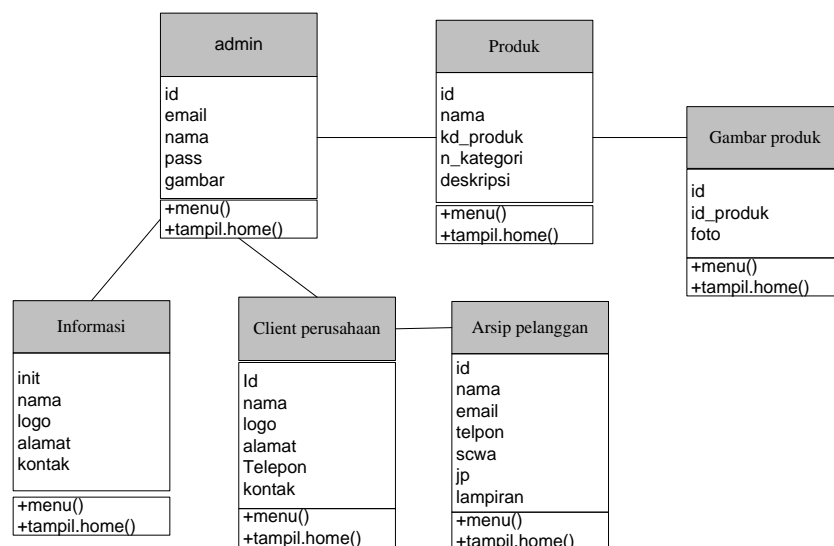


The Class Diagram of the web-based coffee shop information and promotion media development application consists of six tables, each interconnected to support the system in efficiently integrating data. Figure 4 includes users, products, orders, partners, promotions, and feedback designed to facilitate smooth information exchange and optimize user interaction. Employing an object-oriented approach, this diagram guarantees that all system components interact seamlessly, creating a cohesive and consistent user experience. It enhances information accessibility and accelerates the transaction process on the platform, ensuring a more streamlined and efficient operation.

Table 1. Coffee Shop system database

No	Table name	Description
1	admin	To store admin users
2	archive_customer	To store customers
3	gambar_produk	To store products
4	information	To store information
5	in_client	To store clients
6	product	To store products

Figure 4. Class diagram



3.7 Writing program code

This phase encompasses constructing a system or application, leveraging both the software and hardware specified and outlined in prior stages to develop a functional system. Writing program code (coding) transforms the outcomes of the analysis and design phases into a fully operational system. Utilizing PHP for programming, MySQL for database management, the Laragon server and Visual Studio Code as development tools, this stage meticulously translates plans into executable applications. Upon completion of coding, the system undergoes thorough testing and optimization to ensure its efficacy and performance.

3.8 Testing

Each coding is tested through the black box method. This testing is done during the system development to ensure the program code functions according to the defined functional specifications. The black box method tests various functions in developing promotional media and information on the Coffee Shop website, ensuring that all features work as they should.

Table 2.
Web Page Testing
on Coffee Stalls

Testing scitivity	Expected realization	Results
Main page	Login menu	Successful
Dashboard	Display dashboard data	Successful
Admin	Display user profile	Successful
Change user profile	Display profile change data	Successful
Customer records	Display customer archive data	Successful
Add customer archive	Display add customer archive form	Successful
Change customer records	Display customer archive change data	Successful
Delete customer	Display delete customer archive command	Successful
Search customer archive	Display customer archive search data	Successful
Product images	Display product image data	Successful
Add product image	Display add product image form	Successful
Change product image	Display product image change data	Successful

Delete product image	Display delete product image command	Successful
Search product image	Display product image search data	Successful
Information	Display information data	Successful
Change information	Display information change data	Successful
In client	Display in client data	Successful
Add in client	Display add-in client form	Successful
Change in client	Display in client change data	Successful
Delete in client	Display delete in the client command	Successful
Search in client	Display in client search data	Successful
Products	Display product data	Successful
Add product	Display add product form	Successful
Change product	Display product change data	Successful
Delete product	Display the delete product command	Successful
Search product	Display product search data	Successful
Logout	Exit the system	Successful

Based on the test results with the owner of the Coffee Shop, some test samples show that the software works well. However, this test is not entirely perfect because it only covers one aspect of the test. Nevertheless, the tests conducted are expected to represent other functions in the web-based promotional and information media development application for Coffee Shop.

4. Conclusion

This research shows significant progress in using information technology through websites to improve the promotion and customer service processes at Coffee Shop. The Unified Modeling Language (UML) and Waterfall development method have effectively designed a system that meets the functional and non-functional needs of Coffee Shop. The developed website is expected to improve operational efficiency, expand market reach, and reduce dependence on social media with high costs and unpredictable algorithms.

5. Limitations and future work

This research has several limitations. First, the linear and incremental nature of the Waterfall method may lack flexibility in responding to changing needs during the development phase. Secondly, this research is limited to one business location, so the results may not be commonly applied to other types of businesses or locations. Third, the security assumptions implemented in the system have not been tested against more complex attacks or data security breaches. Future research targets are advised to integrate more agile development methods, such as Scrum or Kanban, which allow for rapid iteration and adaptation to changing needs during development. In addition, it is also essential to conduct a more in-depth system security study to assess and strengthen the data security aspects. Given the geographical limitations, further research can be conducted across different types of businesses in different locations to test the adaptability and effectiveness of the website more broadly.

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Declarations

Author contribution

Antoni Steven: Conceptualization, resources, methodology, investigation, data curation and writing - original draft. Novi Hendri Adi: Software, formal analysis, investigation, data curation and writing - review & editing.

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Conflict of interest

No conflicts of interest in this research

Ethical clearance

There are no human subjects in this manuscript and informed consent is not applicable. The research company has agreed to carry out the research and is willing if the results of this research are published.

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